

CLAIMS

1. A method of forming latex particulates having high charge density surfaces, comprising:
 - 5 a) preparing a monomer emulsion including an aqueous phase and an organic monomer phase, said organic monomer phase including at least one blocked acid monomer;
 - b) polymerizing monomers of the organic monomer phase to form blocked acid latex particulates dispersed in the aqueous phase; and
 - 10 c) unblocking the blocked acid latex particulates to form acidified latex particulates.
2. A method as in claim 1, wherein the organic monomer phase includes a monomer mix, and wherein the blocked acid monomer is present at from 0.5 wt%
15 to 50 wt% of the monomer mix.
3. A method as in claim 1, wherein the blocked acid monomer includes a blocked strong acid group selected from the group consisting blocked phosphonic acid, blocked phosphinic acid, blocked pyrophosphoric acid, blocked boronic
20 acid, blocked sulfonic acid, blocked sulfinic acid, blocked phosphorous acid, blocked hydroxamic acid, and blocked cyanuric acid.
4. A method as in claim 1, wherein the blocked acid monomer includes a blocked weak acid group selected from the group consisting of blocked
25 methacrylic acid and blocked acrylic acid.
5. A method as in claim 1, wherein the blocked acid monomer includes an acid blocked by a member selected from the group consisting of halide, ester, thiol ester, and amide.
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6. A method as in claim 1, wherein the blocked acid monomer includes multiple acid groups.

7. A method as in claim 1, wherein the blocked acid monomer is a di- or tri-carboxylic acid-containing monomer.

5 8. A method as in claim 1, wherein the blocked acid monomer is a vinylic acid halide or a vinylic acid ester.

 9. A method as in claim 1, wherein the blocked acid monomer includes a blocked acid group selected from the group consisting of sulfonyl halide, sulfinyl
10 halide, phosphonyl halide, acryloyl halide, and methacryloyl halide.

 10. A method as in claim 9, wherein blocked acid monomer is the sulfonyl halide, said sulfonyl halide being styrene sulfonyl chloride.

15 11. A method as in claim 1, wherein the blocked acid monomer is a styrene sulfonate ester.

 12. A method as in claim 1, wherein the blocked acid monomer is blocked by a member selected from the group consisting of alcohol, phenol, thiol,
20 thiophenol, imide, aniline, silanol, oxime, oxazoline, oxazolidine, and hydrazide.

 13. A method as in claim 1, wherein the blocked acid monomer is blocked by a member selected from the group consisting of methanol, ethanol, propanol, phenol, phenol ester, thiomethanol, benzenethiol, hydroxy succinimide, p-
25 nitroaniline, trimethylsilyl chloride, acetoxime, 2-amino-2-methyl-propan-1-ol, trichloroacetaldehyde, and phenylhydrazine.

 14. A method as in claim 1, wherein the polymerizing step includes copolymerizing multiple monomers.

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 15. A method as in claim 14, wherein the blocked acid monomer is added toward the end of the polymerizing step, thus producing blocked acid latex

particulates having blocked acid groups concentrated at or near the surface of the blocked acid latex particulates.

16. A method as in claim 14, wherein the blocked acid monomer is added
5 throughout the polymerizing step, thus producing blocked acid latex particulates having blocked acid groups throughout the blocked acid latex particulates.

17. A method as in claim 1, wherein the blocked acid latex particulates
10 have an average particle size from 50 nm to 500 nm.

18. A method as in claim 1, wherein the blocked acid latex particulates
have an average particle size from 50 nm to 150 nm.

19. A method as in claim 1, wherein the acidified latex particulates have
15 surface acid groups having a pKa less than about 4.

20. A method as in claim 1, wherein the acidified latex particulates have
surface acid groups having a pKa less than about 3.

20 21. A method as in claim 1, further comprising the step of neutralizing the
acidified latex particulates by forming salts at an outer surface of the acidified
latex particulates.

22. A latex dispersion, comprising:
25 a) an aqueous phase; and
b) latex particulates dispersed in the aqueous phase, said latex
particulates including surface acid groups having a pKa less than about 4, said
acid groups being prepared by removing an associated blocking group.

30 23. A latex dispersion as in claim 22, wherein the surface acid groups
include a strong acid having a pKa less than about 3.

24. A latex dispersion as in claim 23, wherein the strong acid is selected from the group consisting of phosphonic acid, phosphinic acid, pyrophosphoric acid, boronic acid, sulfinic acid, phosphorous acid, hydroxamic acid, and cyanuric acid.

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25. A latex dispersion as in claim 22, wherein the latex particulates are present in the aqueous phase at from 0.5 wt% to 20 wt%.

26. A latex dispersion, comprising:

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a) an aqueous phase; and

b) latex particulates dispersed in the aqueous phase, said latex particulates being prepared from a monomer mix including at least one monomer having multiple acid groups.

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27. A latex dispersion as in claim 26, wherein the multiple acid groups are independently selected from the group consisting of strong acids and weak acids.

28. A latex dispersion as in claim 27, wherein the multiple acid groups are strong acids having a pKa less than 3.

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29. A latex dispersion as in claim 27, wherein the multiple acid groups are weak acids having a pKa greater than 3.

30. A latex dispersion as in claim 27, wherein the multiple acid groups include a strong acid having a pKa less than 3, and a weak acid having a pKa greater than 3.

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31. A latex dispersion as in claim 26, wherein the at least one monomer having multiple acid groups is a di-acid or tri-acid monomer.

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32. A latex dispersion, comprising:

a) an aqueous phase; and

b) blocked acid latex particulates dispersed in the aqueous phase.

33. A latex dispersion as in claim 32, wherein the blocked acid latex particulates include a member selected from the group consisting of blocked
5 phosphonic acid, blocked phosphinic acid, blocked pyrophosphoric acid, blocked boronic acid, blocked sulfinic acid, blocked phosphorous acid, blocked hydroxamic acid, and blocked cyanuric acid.

34. A latex dispersion as in claim 32, wherein the blocked acid latex
10 particulates include polymer units derived from blocked multiple acid monomers.

35. A latex dispersion as in claim 32, wherein the latex particulates are present in the aqueous phase at from 0.5 wt% to 20 wt%.

15 36. A latex-containing ink-jet ink, comprising:
a) a liquid vehicle;
b) a colorant dissolved or dispersed in the liquid vehicle; and
c) latex particulates dispersed in the liquid vehicle, said latex particulates formed by the steps of:

20 i. preparing a monomer emulsion including an aqueous phase and an organic monomer phase, said organic monomer phase including at least one blocked acid monomer,
ii. polymerizing monomers of the organic monomer phase to form blocked acid latex particulates dispersed in the aqueous phase, and
25 iii. unblocking the blocked acid latex particulates to form acidified latex particulates.

37. A latex-containing ink-jet ink as in claim 36, wherein the aqueous
phase is part of the liquid vehicle.

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38. A latex-containing ink-jet ink as in claim 36, wherein the colorant is a pigment.

39. A latex-containing ink-jet ink as in claim 38, wherein the pigment is a self-dispersed pigment.

5 40. A latex-containing ink-jet ink as in claim 38, wherein the pigment is a polymer-dispersed pigment, and wherein the ink-jet ink further comprises a pigment dispersing agent.

10 41. A latex-containing ink-jet ink as in claim 36, wherein the blocked acid monomer includes a blocked strong acid group selected from the group consisting of blocked phosphonic acid, blocked phosphinic acid, blocked pyrophosphoric acid, blocked boronic acid, blocked sulfonic acid, blocked sulfinic acid, blocked phosphorous acid, blocked hydroxamic acid, and blocked cyanuric acid.

15 42. A latex-containing ink-jet ink as in claim 36, wherein the blocked acid monomer is selected from the group consisting of blocked methacrylic acid and blocked acrylic acid.

20 43. A latex-containing ink-jet ink as in claim 36, wherein the blocked acid monomer includes an acid blocked by a member selected from the group consisting of halide, ester, thiol ester, and amide.

25 44. A latex-containing ink-jet ink as in claim 36, wherein the blocked acid monomer is a di-acid or tri-acid monomer.

 45. A latex-containing ink-jet ink as in claim 36, wherein the acidified latex particulates have surface acid groups having a pKa less than about 4.

30 46. A latex-containing ink-jet ink as in claim 36, wherein the acidified latex particulates have surface acid groups having a pKa less than about 3.

47. A latex-containing ink-jet ink as in claim 36, wherein the blocked acid monomer used to prepare the acidified latex particulates includes multiple blocked acid groups.

5 48. A blocked acid monomer for preparing surface acidified latex particulates, said blocked acid monomer comprising:
 a polymerizable group;
 an acid group coupled to the polymerizable group; and
 a blocking group coupled to the acid group, thereby rendering the acid
10 group inactive, said blocking group being removable after emulsion polymerization of the blocked acid monomer to reconstitute the acid group.

 49. A blocked acid monomer as in claim 48, wherein the polymerizable group is a vinylic group.

15 50. A blocked acid monomer as in claim 48, wherein the acid group has a pKa less than about 4.

 51. A blocked acid monomer as in claim 48, wherein the acid group is a
20 strong acid having pKa less than about 3.

 52. A blocked acid monomer as in claim 48, further comprising a second acid group coupled to the polymerizable group.

25 53. A blocked acid monomer as in claim 48, wherein the acid group is directly coupled to the polymerizable group.

 54. A blocked acid monomer as in claim 48, wherein the acid group is coupled to the polymerizable group through a spacer group.

30 55. A blocked acid monomer as in claim 54, wherein the spacer group includes a C1 to C8 lower alkyl group or a phenyl group.

56. A blocked acid monomer as in claim 48, wherein the acid group is a strong acid selected from the group consisting of phosphonic acid, phosphinic acid, pyrophosphoric acid, boronic acid, sulfonic acid, sulfinic acid, phosphorous acid, hydroxamic acid, and cyanuric acid.

57. A blocked acid monomer as in claim 48, wherein the acid group is selected from the group consisting of methacrylic acid and acrylic acid.

58. A blocked acid monomer as in claim 48, wherein the blocking group is selected from the group consisting of halide, ester, thiol ester, and amide.

59. A blocked acid monomer as in claim 48, wherein the blocked acid monomer is a vinylic acid halide.

60. A blocked acid monomer as in claim 48, wherein the blocked acid monomer is a vinylic acid ester.

61. A blocked acid monomer as in claim 48, wherein the blocked acid monomer is selected from the group consisting of sulfonyl halide, sulfinyl halide, phosphoryl halide, acryloyl halide, and methacryloyl halide.

62. A blocked acid monomer as in claim 61, wherein blocked acid monomer is the sulfonyl halide, said sulfonyl halide being styrene sulfonyl chloride.

63. A blocked acid monomer as in claim 48, wherein the blocked acid monomer is a styrene sulfonate ester.

64. A blocked acid monomer as in claim 48, wherein the blocking group is selected from the group consisting of alcohol, phenol, thiol, thiophenol, imide, aniline, silanol, oxime, oxazoline, oxazolidine, and hydrazide.

65. A blocked acid monomer as in claim 48, wherein the blocking group is selected from the group consisting of methanol, ethanol, propanol, phenol, phenol ester, thiomethanol, benzenethiol, hydroxy succinimide, p-nitroaniline, trimethylsilyl chloride, acetoxime, 2-amino-2-methyl-propan-1-ol, trichloroacetaldehyde, and phenylhydrazine.